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Claims

[c1] 1.A method for forming a multicore fiber preform structure, the method comprising:
inserting a plurality of rare-earth doped rods into a corresponding plurality of hollow capillaries;
arranging a resulting plurality of filled capillaries into a preform pattern;
collapsing said plurality of filled capillaries into an initial preform structure, wherein a portion of the material of said capillaries forms an initial inner cladding;
inserting said initial preform structure into a cylinder; and
fusing said cylinder and said initial preform structure so as to form a final preform structure with a final inner cladding having an increased thickness with respect to said initial inner cladding.

[c2] 2.The method of claim 1, wherein said hollow capillaries are formed from silica.

[c3] 3.The method of claim 1, wherein said filled capillaries are arranged into a hexagonal pattern.

[c4] 4.The method of claim 3, wherein said hollow capillaries

have a circular cross-sectional shape.

[c5] 5.The method of claim 4, wherein said hollow capillaries have a hexagonal cross-sectional shape.

[c6] 6.The method of claim 1, further comprising forming at least one flat surface along the length of said final pre-form structure.

[c7] 7.The method of claim 6, wherein said final preform structure comprises a D-shaped cross section.

[c8] 8.The method of claim 6, wherein said final preform structure comprises a rectangular cross section.

[c9] 9.The method of claim 6, wherein said final preform structure comprises a square cross section.

[c10] 10.The method of claim 1, wherein said capillaries and said cylinder are chosen such that said final inner cladding has an equivalent index of refraction as said initial inner cladding.

[c11] 11.A method for forming a multicore fiber laser array, the method comprising:
inserting a plurality of rare-earth doped rods into a corresponding plurality of hollow capillaries;
arranging a resulting plurality of filled capillaries into a preform pattern;

collapsing said plurality of filled capillaries into an initial preform structure, wherein a portion of the material of said capillaries forms an initial inner cladding;
inserting said initial preform structure into a cylinder;
fusing said cylinder and said initial preform structure so as to form a final preform structure with a final inner cladding having an increased thickness with respect to said initial inner cladding;
forming at least one flat surface along the length of said final preform structure; and
simultaneously drawing a fiber from said final preform structure and from a layer of outer cladding material.

[c12] 12.The method of claim 11, wherein said hollow capillaries are formed from silica.

[c13] 13.The method of claim 11, wherein said filled capillaries are arranged into a hexagonal pattern.

[c14] 14.The method of claim 13, wherein said hollow capillaries have a circular cross-sectional shape.

[c15] 15.The method of claim 14, wherein said hollow capillaries have a hexagonal cross-sectional shape.

[c16] 16.The method of claim 11, wherein number of said plurality of filled capillaries in said initial preform structure is about 100 or more.

[c17] 17.The method of claim 11, wherein said final preform structure comprises a D-shaped cross section.

[c18] 18.The method of claim 11, wherein said final preform structure comprises a rectangular cross section.

[c19] 19.The method of claim 11, wherein said final preform structure comprises a square cross section.

[c20] 20.The method of claim 11, wherein said capillaries and said cylinder are chosen such that said initial inner cladding has and equivalent index of refraction as said final inner cladding, and wherein said final inner cladding has a different index of refraction than said outer cladding material.